

# A REVISION OF THE BOGUEIDAE HARTMAN AND FAUCHALD, 1971, AND ITS REDUCTION TO BOGUEINAE, A SUBFAMILY OF MALDANIDAE (POLYCHAETA)

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*Abstract.*—*Boguea enigmatica* Hartman, 1945, is redescribed and its known range extended. Notes on its larval development are presented. The description of *Boguella ornata* Hartman and Fauchald, 1971, is emended. Based on these revisions, the family Bogueidae is reduced to Bogueinae, a subfamily of Maldanidae based on morphological and ontogenetic criteria. Keys to the subfamilies of Maldanidae, modified from Fauchald (1977), and to the genera of Bogueinae are given.

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Hartman (1945) first described *Boguea enigmatica* from Bogue Sound, North Carolina, as a member of the Oweniidae. Hartman and Fauchald (1971) later described *Boguella ornata* from deep waters off the coast of New England, at which time they also erected the family Bogueidae with *Boguea* as the type-genus. *Boguea enigmatica* and *Boguella ornata* have not been recorded outside of their type-localities.

Superficially the Bogueidae are unique among the polychaetes in possessing avicular (terebelloid) uncini and yet lacking the head modifications typical of other families with avicular uncini (e.g., Terebellidae, Ampharetidae, Sabellidae, and Pectinariidae). However, the following redescription of *Boguea enigmatica* and emended description of *Boguella ornata* show that the Bogueidae share many morphological and ontogenetic characters with the Maldanidae; therefore, Bogueidae is reduced to a subfamily of the Maldanidae.

Due to the apparent disagreements in definitions of life stages (see Bookhout and Horn 1949, and Hermans 1979, for example), it is necessary to define the criteria used in this paper for separating larvae, juveniles, and adults. Specimens are considered larvae if they still contain some yolk material. Depending upon the stage of development, larvae may or may not possess rostrate uncini. Larvae examined range from 2 to about 16 setigers long. Ciliated bands were not seen on any of the larvae examined. Specimens are considered juveniles if they lack yolk material, yet still possess the rostrate uncini in the anterior setigers. Juveniles range from about 15–23 setigers. Adults are those individuals lacking rostrate uncini (except perhaps in far posterior setigers), and ranging from about 23–30 setigers. It should be noted that the above life-stage distinctions pertain only to *Boguea enigmatica* as it is described in this paper.

## Bogueinae, new rank

Oweniidae (in part).—Hartman, 1945:42.

Bogueidae.—Hartman and Fauchald, 1971:148.—Fauchald, 1977:135.—Hobson and Banse, 1981:20.

*Diagnosis.*—Cephalic plaque absent; cephalic keel and ciliated nuchal slits present. Segmental collars absent. Notopodial spines may be present in far posterior setigers. Neurosetae as avicular (terebelloid) uncini, arranged in single or double rows. Pygidium simple or adorned with papillae; anus terminal, without a ventral valve.

*Boguea* Hartman, 1945

*Diagnosis.*—Cephalic keel distinct. Body composed of three well defined regions. Uncini from setiger 5, in single rows to setiger 9, then in double rows except in far posterior setigers. Notopodial spines present in far posterior setigers. Pygidium simple, without papillae.

*Boguea enigmatica* Hartman, 1945

*Boguea enigmatica* Hartman, 1945:42, pl. 7, figs. 4–6.—Hartman and Fauchald, 1971:148, pl. 23, figs. h–i.

*Material examined.*—NORTH CAROLINA: Bogue Sound, Summer, 1940, 6–10 ft., sand overlaid with shell fragments, holotype (AHF Poly 0391) and 35 paratypes (AHF Poly 0392); 6 Aug 1962, 2–3 m, sand and shell (primarily *Crasostrea virginica*), 15 specimens (ZMC); 10 May 1972, ca 2.5 m, sand and shell, 2 specimens (both gravid, 1 with brood) (ZMC). SOUTH CAROLINA: Sta. 0797(4B), 25 Aug 1977, 31°53'N, 80°46'W, 13 m, sand, 1 juvenile (USNM 059817), 1 juvenile (Texas Instruments collection). GEORGIA: Sta. 0220(5C), 25 Feb 1977, 31°08'N, 80°50'W, 19 m, sand, 1 specimen (Texas Instruments collection); Sta. 0513(5B), 16 May 1977, 31°12'N, 81°08'W, 11 m, sand, 1 specimen (Texas Instruments collection); Sta. 0517(5C), 16 May 1977, 31°08'N, 80°50'W, 14 m, sand, 2 specimens (USNM 059823); 1 juvenile (USNM 059815); 2 specimens (Texas Instruments collection); Sta. 0828(5C), 31 Aug 1977, 31°08'N, 80°50'W, 14 m, sand, 1 juvenile (USNM 059816); Sta. 1263(5B), 31°12'N, 81°08'W, 11 m, sand, 1 specimen (USNM 059822). FLORIDA, Northeast: Sta. 0877(6F), 9 Jan 1977, 30°23'N, 80°18'W, 43 m, sand, 1 juvenile (Texas Instruments collection); Sta. 0862(6B), 31 Aug 1977, 30°23'N, 81°15'W, 15 m, sand, 2 specimens (USNM 059820 and 059821). Tampa Bay: Interstate Electronics Corp. 713TB, Sta. 003, 11 Oct 1979, 27°37.1'N, 82°54.0'W, 12 m, sand-gravel, 10 specimens (2 females); Sta. 004, 11 Oct 1979, 27°37.1'N, 82°55.1'W, 10 m, sand, 4 specimens; Sta. 013, 11 Oct 1979, 27°37.6'N, 82°54.5'W, sand-gravel, 3 specimens; 723TB, Sta. 001, Jan 1980, 27°37.6'N, 82°54.5'W, 13 m, sand, 1 specimen; Sta. 003, Jan 1980, 27°37.1'N, 82°54.0'W, 12 m, sand-gravel, 3 specimens; Sta. 004, Jan 1980, 27°37.1'N, 82°55.1'W, 10 m, sand, 1 specimen; Sta. 006, Jan 1980, 27°36.5'N, 82°53.4'W, 12 m, sand-gravel, 2 specimens. FLORIDA, Southwest: BLM, Sta. 24C, Nov 1980, 25°16.90'N, 83°43.18'W, 88.4 m, medium sand, 1 specimen; Sta. 2101H (MAF-LA), Feb 1978, 26°24'59.6"N, 82°15'08.9"W, 11 m, sand, 1 specimen. Pensacola: Interstate Electronics Corporation, 732MO, Sta. 012, June 1980, 30°17.2'N, 87°18.5'W, 6 m, sand, 1 juvenile. ALABAMA: Mobile Bay (Mobil Oil Corporation), Sta. 053, July 1978, 30°15'13"N, 88°03'08"W, 6 m, sand, 1 specimen. MISSISSIPPI: Horn Island, Corps of Engineers, Sta. 023, 7 Nov 1980, 30°15.05'N, 88°49.78'W, 5.5 m, sand, 33 specimens (including 1 female with brood of 31

larvae); 3 Apr 1981, 44 specimens (including 3 females, 1 ripe male, 20 juveniles, 9 larvae). Petit Bois Island, Corps of Engineers, Sta. 038, 22 Oct 1980, 30°13.91'N, 88°32.48'W, 3.8 m, sand 1 specimen; 3 Apr 1981, 167 specimens (including 12 females, 4 ripe males, 39 juveniles, 66 larvae). TEXAS: East Flower Garden Reef, U.S. National Marine Fisheries Service, Sta. EFG-IV-6-3, 22 Oct 1981, 27°53.63'N, 93°39.10'W, 102 m, silty sand, 2 specimens; Sta. EFG-IV-7-4, 26 Oct 1981, 27°55.38'N, 93°38.96'W, 101 m, silty sand, 1 juvenile.

*Redescription*.—Length to about 10.0 mm, width to about 0.5 mm. Adults to about 30 setigers. Glandular areas present, accentuated by methyl green staining. Midventral glandular streak present along entire length of worm from posterior rim of mouth.

Body (Fig. 1a) divided into 3 regions marked by degree of segmentation, types and number of notosetae, number of rows of uncini as well as relative number of individual uncini in each row, and development and distribution of glandular areas.

*Anterior region*.—Comprises prostomium, peristomium, and setigers 1–8. Prostomium (Fig. 1a–b) rounded and slightly flattened anteriorly, arched dorsally due to presence of cephalic keel; cephalic plaque absent; curved, ciliated nuchal slits located laterally. Cilia present around ventral perimeter of prostomium, in addition ciliated areas present at least laterally on prostomium and peristomium. Exact location and amount of cilia indeterminable due to poor condition of specimens.

Prostomium and peristomium fused; peristomium with large rounded mouth ventrally. Margin of peristomium and setiger 1 indistinct except for slight lateral indentations.

Segmentation of anterior region distinct from setiger 2. Setigers 2–8 campanulate when contracted, each widest anteriorly; when extended, each setiger longer than wide, with rounded margins. Collars absent; junction of setigers 8–9 indistinct.

Notopodia with simple setae only, emerging from small conical projections near middle of each setiger. Setae smooth basally, finely hispid along most of length (Fig. 1c). Up to 8 setae per fascicle arranged in 2 rows of 4 each; occasionally with 1–2 additional small, thin capillary setae.

Neuropodia present from setiger 5 as small, slightly elevated tori, each with single row of avicular uncini. Each uncinus with about 15 teeth arranged in 3 crescentic rows surmounting large, anteriorly directed main fang (Fig. 1d–e). Uncini numbering 5–9 on setiger 5, gradually increasing to 7–11 on setiger 8.

Glandular areas of anterior region are shown in Fig. 1a, after staining with methyl green (Banse 1970). Prostomium and peristomium with scattered cells, saddled area at cephalic keel, and narrow belt at frontal margin of prostomium. Glandular cells of setiger 1 scattered throughout with additional encircling band of cells anterior to notopodia. This band is interrupted by the midventral glandular streak. Glandular areas of setigers 2–8 completely encircle the body.

*Middle region*.—Comprises setigers 9–14. Segmentation indistinct; setigers longer than wide; notopodia and neuropodia as in anterior region.

Notosetae (Fig. 1f) similar to those in anterior region but about half as wide and numbering only 4 per fascicle arranged in 2 rows of 2 each.

Uncini in double rows from setiger 9. Anterior row with 2–5 uncini, their main

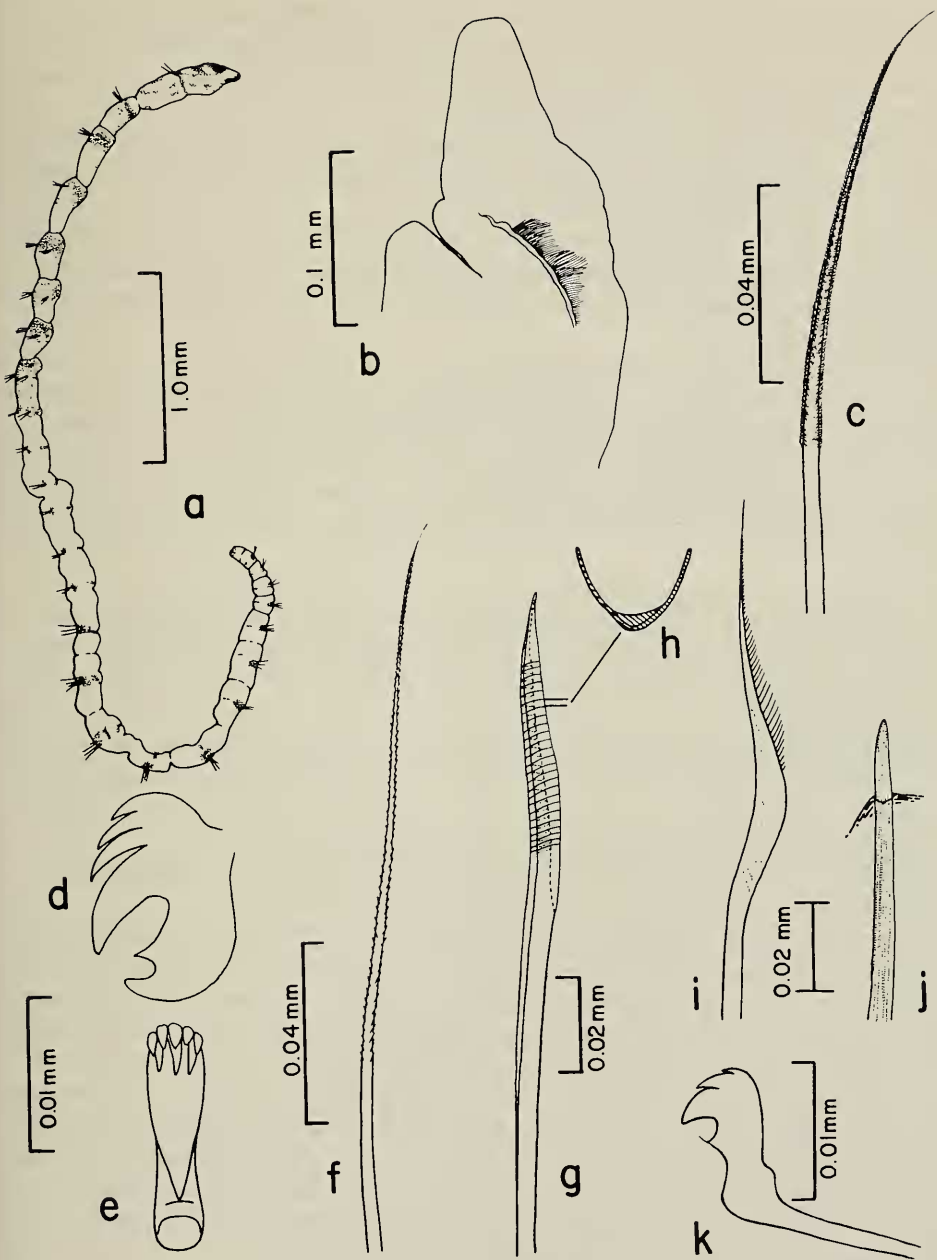


Fig. 1. *Boguea enigmatica*: a, Whole worm showing staining pattern, lateral view; b, Prostomium, lateral view; c, Hispid notoseta from setiger 2; d, Avicular uncinus from setiger 7, lateral view; e, Same, edge-on view; f, Notoseta from setiger 11; g, Channelled notoseta from setiger 16; h, Same, diagrammatic cross section; i, Serrate notoseta from setiger 16; j, Notopodial spine from setiger 16; k, Juvenile rostrate uncinus from setiger 2.



fangs directed posteriorly. Posterior row with 8–14 uncini, their main fangs directed anteriorly. About 4 uncini added to anterior row by setiger 14 while number of uncini in posterior row remains constant or randomly varies by 1–2. Shape and dentition of uncini as in anterior region.

Glandular regions (after methyl green staining) restricted to small areas around notopodia and posterior to neuropodial tori; some specimens may also have scattered cells dorsally on setiger 9 (Fig. 1a).

*Posterior region.*—Comprises remainder of body from setiger 15 to pygidium. Segmentation indistinct (except in far posterior setigers) (Fig. 1a). Setigers gradually decreasing in length and width posteriorly; noto- and neuropodia as in previous body regions.

Notopodia each with 2 rows of simple setae: anterior row of about 6 setae which, viewed laterally, appear unilimbate (Fig. 1g); edge-on view reveals 2 margins forming U-shaped channel (Fig. 1h). Posterior row of about 6 serrate simple setae (Fig. 1i), each alternating with channelled setae and strongly curved towards anterior end of worm. Notoetae decreasing in number and gradually replaced by narrow capillary setae and 1–4 acicular spines (Fig. 1j) in 3–7 posteriormost setigers.

At setiger 15, number of uncini in posterior row abruptly decreases ( $\bar{x} = 4.8$ ,  $n = 6$ ); anterior row retains nearly same number of uncini as in preceding setigers. Farther back number of uncini in both rows gradually decreases with anterior row decreasing more rapidly than posterior row; last 1–2 setigers sometimes devoid of uncini.

Glandular areas of some specimens located only at neuropodial tori. In others, even from same locality, cells also present at notopodia and coalesce across dorsum.

Pygidium simple with terminal anus; ventral valve absent.

*Distribution.*—Atlantic, North Carolina to northwest Florida; Gulf of Mexico, southern Florida to Texas; 2–102 m; primarily sand substrata.

*Notes on larval development.*—*Bogoea enigmatica* broods its young. Gravid females were found in clear tubes together with eggs and variously developed larvae. The broods were found in abandoned serpulid polychaete tubes, but more often, the boguein tube was cemented to the concave side of empty bivalve shells (e.g., *Spisula soldissima* and indeterminable venerids in the Mississippi Sound area, and *Crassostrea virginica* in Bogue Sound, North Carolina). Developing larvae were found between the body of the mother and the interior wall of the tube. Other eggs remained inside the mother's body. The brood sometimes revealed all stages of larval development from egg to advanced larval stage (14–16 setigers). Eggs of one female *B. enigmatica* measured about 220  $\mu\text{m}$ . There were approximately 75 eggs within the female's body cavity.

Of the setigerous larvae examined, none has less than 2 pairs of notosetal bundles. It appears then, following the reasoning of Bookhout and Horn (1949), that the first 2 pairs of bundles appear simultaneously even though the notopodia of the first setiger may each contain 2 notosetae while the notopodia of the second setiger each contain only 1 seta. All notosetae are very thin, without discernible limbate margins or pinnae as in the adult. The mouth begins forming at the 3-setiger stage. Rostrate uncini (Fig. 1k) begin developing at the 4-setiger stage (Fig. 2a). At the 6-setiger stage (Fig. 2b), nuchal slits are apparent for the first time although they do not appear ciliated.

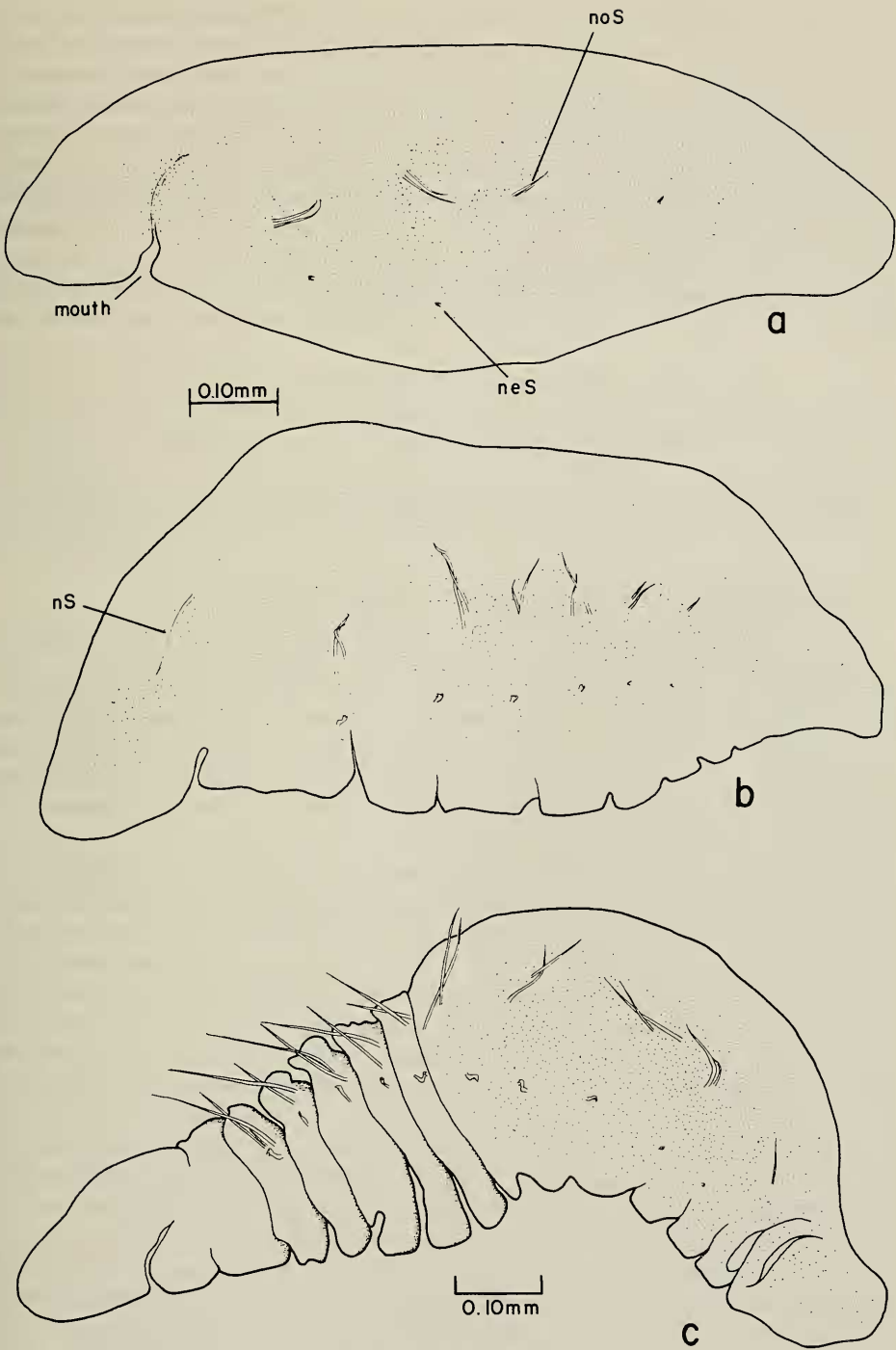


Fig. 2. *Boguea enigmatica* larvae: a, 4-setiger stage; b, 6-setiger stage; c, 10-setiger stage. nS, nuchal slit; neS, neuroseta; noS, notosetae; stippling indicates yolk.

At the 10-setiger stage (Fig. 2c), a pharynx is visible, segmentation of setigers 1-5 is distinct, yolk remains posterior to setiger 6, and rostrate uncini are well developed anteriorly. Also at the 10-setiger stage, the anus becomes apparent.

At the 12-setiger stage, the first avicular uncinus appears, developing below the rostrate uncinus of setiger 5. At the 15- to 16-setiger stage, the anterior row of avicular uncini on setiger 9 is developing and notopodial spines are present in the last 1-2 setigers. The adult distribution and types of notosetae are still not apparent. All yolk material has been absorbed and segmentation is distinct throughout. Fecal pellets are present in some specimens.

The smallest specimen of *B. enigmatica* not found with other larvae is 16 setigers long. This is about the stage at which larvae emerge from the parent tube.

At the 17-setiger stage, some anterior notosetae are limbate and have distal pinnae as in the adult. At the 19-setiger stage, the channelled notosetae as well as the serrate notosetae of the posterior region are seen developing for the first time.

In general, development of all morphological characters proceeds from the anterior to the posterior end. The development of notosetae always precedes that of the neurosetae. In contrast, at the 11-setiger stage of *Axiiothella mucosa*, uncini develop before the notosetae (Bookhout and Horn 1949).

Juvenile specimens (about 16-23 setigers) are morphologically identical to adults except that the juveniles have 2 types of neurosetae. The rostrate uncini (Fig. 1k) are present, 1 per fascicle, from setiger 1. Beginning at setiger 5, the rostrate uncinus is always located in the superior part of the neuropodial fascicle. As the worm matures, the rostrate uncini are lost randomly along the body, usually occurring first in the anterior setigers. The specimens are thus left in the typical adult condition of having only avicular uncini, except in some far posterior setigers where occasionally a rostrate uncinus is present.

The loss of the rostrate uncini gives a clue to setal formation and migration, i.e., setae form ventrally in the fascicle and migrate dorsally where they are lost. Further evidence for this process is found in observing where the smallest avicular uncinus occurs in the fascicle. In developing worms, the smallest uncinus is always located dorsally with consecutively larger uncini being formed ventrally. This sequence is consistent with that found by Pilgrim (1977) for *Clymenella torquata* (Leidy, 1855) and *Euclymene modesta* (Quatrefages, 1865). Bookhout and Horn (1949, fig. 11) show a rostrate uncinus for larval *Axiiothella mucosa* that is quite different from the adult uncinus (Andrews 1891, fig. 35). Day (1967: 616) states that the first uncini in maldanids appear as "S-shaped hooks," although he does not give specific examples or pertinent citations. Larval uncini are reported for members of other families as well, e.g., Sabellidae (*Euchone*) by Banse (1970) and Ampharetidae (*Hobsonia florida*) by Zottoli (1974).

That larval uncini can be lost and not replaced, as is the case in the first four setigers of *B. enigmatica*, may not be uncommon. I have observed that juvenile specimens of *Asychis elongata* (Verrill, 1873) collected in Mississippi Sound have a pair of rostrate uncini in setiger 1. As the worm matures, the uncini are lost leaving the adult arrangement, i.e., uncini absent in setiger 1.

*Remarks.*—The staining technique used here was described by Banse (1970). The stain delineates, presumably, the mucus-secreting cells. Before staining,

glandular cells appear only as thickened, granular regions limited to setigers 2–8. Methyl green staining reveals glandular cells as described above and shown in Figure 1a. Larvae and juveniles were not stained.

This redescription of *Boguea enigmatica* differs considerably from the original. The most noteworthy discrepancy is that uncini begin on setiger 5 instead of 4 as stated by Hartman (1945). Among the paratypes and other specimens examined are individuals with uncini beginning on setiger 4. This is, however, due to regeneration of the anterior end.

As in other maldanids, *Boguea enigmatica* has a large, sac-like proboscis indicating that it is a deposit feeder. Cursory gut analysis revealed tests of diatoms and protozoans such as Radiolaria.

*Boguella* Hartman and Fauchald, 1971, emended

*Diagnosis*.—Cephalic keel and nuchal slits poorly defined. Uncini from setiger 4, in double rows except in far posterior setigers. Both *Rhodine*-type and avicular (terebelloid) uncini present in most setigers. Plumose notosetae present medially. Notopodial spines absent. Pygidium papillate.

*Boguella ornata* Hartman and Fauchald, 1971, emended

*Boguella ornata* Hartman and Fauchald, 1971:149, pl. 23, figs. a–g.

*Material examined*.—NEW ENGLAND: Bermuda rise, Sta. A119, 19 Aug 1966, 32°15.8' to 32°16.1'N, 64°31.6' to 64°32.6'W, 2095–2223 m, pteropod ooze, holotype (AHF Poly 0927), and 16 paratypes (AHF Poly 0928).

*Description*.—Length to about 7.0 mm, width to about 0.6 mm. Largest specimen (holotype) with 25 setigers. Prostomium globular and rounded anteriorly. Cephalic keel and nuchal slits poorly defined (Fig. 3a). Prostomium and peristomium fused; peristomium with small crescentic mouth. Entire head granular in appearance (Fig. 3a). Peristomium followed by 1–2 long asetigerous segments.

Segmentation distinct throughout; anterior margins of some anterior setigers sometimes collar-like depending upon state of contraction.

Notosetae of setigers 1–6 of 2 types (Fig. 3b) arranged in 2 rows per fascicle. Setae of anterior row stout, abruptly tapering, pubescent; setae of posterior row smooth basally, with fine pinnae distally. Notosetae of setigers 7 or 8 through 15–17 include thin, minutely hispid simple setae and 1–4 long, plumose setae (Fig. 3c); thereafter notosetae as in setigers 1–6.

Uncini avicular, beginning on setiger 4 in double rows (Fig. 3d); anterior row of 22-setiger paratype composed of smaller, *Rhodine*-type uncini (Fig. 3e), posterior row composed of larger terebelloid uncini (Fig. 3f). Uncini of both anterior and posterior rows similar in size and terebelloid in shape on setiger 11. Anterior row with larger, terebelloid uncini and posterior row with smaller, *Rhodine*-type uncini from setiger 12 to about 17. Posterior row of uncini absent from setiger 18; all uncini absent from setiger 19. Pygidium as described by Hartman and Fauchald (1971:151, pl. 23, fig. c).

*Remarks*.—The emended description differs considerably from the original given by Hartman and Fauchald (1971:149). One noteworthy discrepancy is the setiger on which the uncini are first present. On the holotype and 14 of the 16



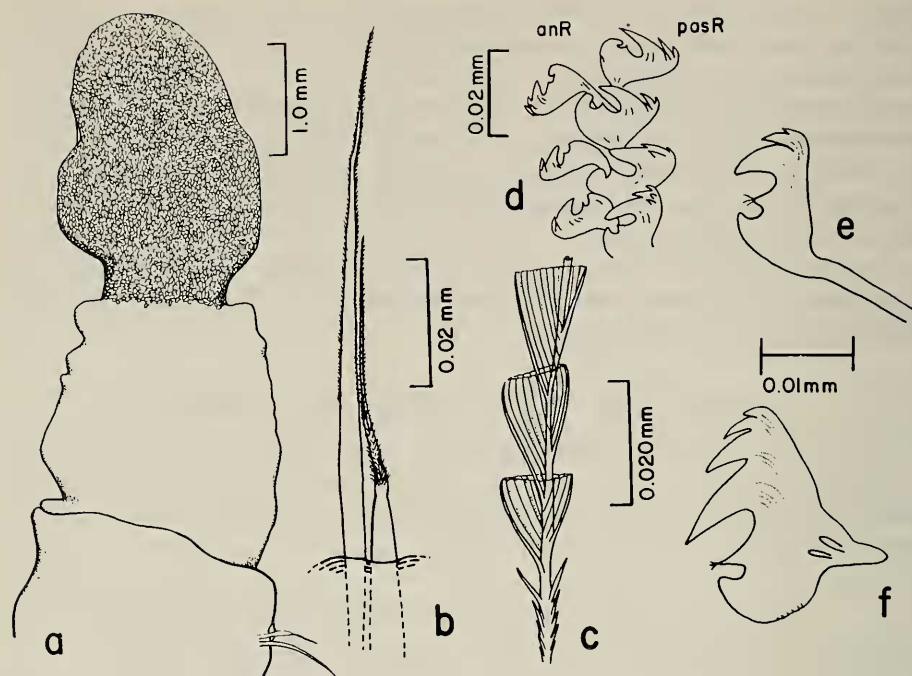


Fig. 3. *Boguella ornata*: a, Anterior end, lateral view; b, Notosetae from setiger 4; c, Part of plumose notoseta from setiger 12; d, Neuropodial uncini from setiger 4; e, *Rhodine*-type uncinus from setiger 9, lateral view; f, Avicular uncinus from same, lateral view. anR, anterior row; poR, posterior row.

paratypes, the uncini begin on setiger 4; however, on two of the paratypes, the uncini begin on setiger 5. On those two specimens, another setiger has been added anteriorly, thereby not affecting setal arrangements of posterior setigers, e.g., plumose setae still beginning on setiger 7. No specimens contained anterior setigers with just one row of uncini as originally described. Because of the poor condition of all type-material, the distribution of glandular areas could not be determined with certainty. It does appear, however, that the heaviest concentration of gland cells is in setigers 1–8; in some specimens these areas retained a brown pigment. In addition, the prostomium may be completely covered with gland cells due to the dense granular appearance of the epidermis (Fig. 3a). In some specimens, dorsolateral nuchal slits could be seen under low magnification; however, these structures could not be seen on slide-mounted specimens.

*Boguella ornata* is known only from its original discovery (Hartman and Fauchald 1971:151).

**Discussion.**—During examination of specimens of *Boguea enigmatica*, including type-material, it became apparent that this species has many characters in common with the Maldanidae. These are: 1) presence of a cephalic keel as in the Lumbriclymeninae and Rhodininae; 2) presence of ciliated nuchal slits apparently identical to those of the Lumbriclymeninae; 3) presence of a large ventral mouth

cavity; 4) fused prostomium and peristomium; 5) distinctly segmented anterior body region of 8 setigers; 6) fused junction of setigers 8 and 9; 7) indistinctly segmented posterior body region; 8) unadorned pygidium as in the Lumbricymeninae and Rhodininae; 9) presence of capillary notosetae arranged in 2 rows per fascicle as described for *Euclymene oerstedii* and *Clymenella torquata* (Pilgrim 1977); 10) presence of fine pinnae on the notosetae; 11) change in the type of notosetae posteriorly; 12) presence of distinct glandular regions, which are more pronounced anteriorly and diffuse posteriorly; 13) presence of uncini in double rows, facing in opposite directions in some setigers, as in the Rhodininae; 14) uncini beginning on setiger 5 as in some species of Rhodininae; 15) presence of rostrate larval uncini that are very similar to typical maldanid uncini and to rostrate uncini of larval *Axiiothella mucosa* (Bookhout and Horn 1949); 16) ventral formation and dorsal migration and loss of noto- and neurosetae as in *Euclymene oerstedii* and *Clymenella torquata*.

*Boguella ornata*, in addition to most of the characters above, shares at least two additional characters with the Maldanidae: plumose setae, similar to those shown for *Asychis elongata* by Light (1974, fig. 1c); and *Rhodine*-type uncini.

*Boguea enigmatica* differs from maldanids, as currently described, in having: 1) three constant and well defined body regions; 2) notopodial spines in posterior setigers; 3) true avicular uncini; and 4) uncini beginning in single rows, changing to double rows, and then back to single rows posteriorly. *Boguella ornata* additionally differs from maldanids in having a unique papillated pygidium, and abruptly tapering, pubescent notosetae.

Some maldanids may actually have three well defined body regions. Most present descriptions allude to the presence of at least two body regions based primarily on degree of segmentation. Pilgrim (1977) described three body regions for *Euclymene oerstedii* and *Clymenella torquata* based on changes and patterns in the relative numbers of neurosetae from one region to the next. The body regions would be defined differently in these two species if degree of segmentation was used. Maldanid body regions cannot be defined until very detailed morphological comparisons are made. Included in this review should be a variety of morphological features such as the degree of segmentation; the number, type, and distribution of notosetae and neurosetae; the distribution of glandular regions; and perhaps even certain internal structures such as the alimentary canal and nephridia (Pilgrim 1965, 1977).

Notopodial spines are presently unknown among the maldanids. True avicular uncini like those of terebellids are also absent among maldanids; however, the uncinus of the Rhodininae resembles the avicular uncini. The *Rhodine*-type uncinus has a prominent posterior process which is lacking in the avicular uncinus. It is particularly noteworthy that *Boguella ornata* has both types of uncini. *Boguella*, then, may be the phylogenetic "link" between the Rhodininae and newly proposed Bogueinae.

In considering the above discussion, it is concluded that *Boguea enigmatica* and *Boguella ornata* possess characters which would place them in the Maldanidae. However, no existing subfamily can contain them primarily because of the type and distribution of their uncini. It is for this reason that I propose to reduce the family Bogueidae to the subfamily Bogueinae within the Maldanidae.

Key to the Subfamilies of Maldanidae  
(Modified from Fauchald 1977)

1. Both cephalic and anal plaques absent ..... 2
  - At least anal plaque present ..... 4
2. Avicular uncini present ..... Bogueinae
  - Avicular uncini absent, only rostrate uncini present ..... 3
3. Rostrate uncini in double rows, posterior segments with encircling collars ..... Rhodininae
  - Rostrate uncini in single rows, posterior segments not collared ..... Lumbriclymeninae
4. Cephalic plaque absent, anal plaque present ..... Nicomachinae
  - Both cephalic and anal plaques present ..... 5
5. Anus dorsal ..... Maldaninae
  - Anus terminal ..... Euclymeninae

Key to the Bogueinae Genera

1. Uncini present from setiger 4, plumose notosetae (Fig. 3c) present in middle setigers ..... *Boguella*
  - Uncini present from setiger 5, plumose notosetae absent ..... *Boguea*

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## Literature Cited

- Andrews, E. A. 1891. Report upon the Annelida Polychaeta of Beaufort, North Carolina.—Proceedings of the United States National Museum 14(852):277–302.
- Banse, K. 1970. The small species of *Euchone* Malmgren (Sabellidae, Polychaeta).—Proceedings of the Biological Society of Washington 83(35):387–408.
- Bookhout, C. G., and E. C. Horn. 1949. The development of *Axiiothella mucosa* (Andrews).—Journal of Morphology 84:145–183.
- Day, J. H. 1967. A monograph on the Polychaeta of Southern Africa.—British Museum of Natural History Publication 656:1–878.
- Fauchald, K. 1977. The polychaete worms. Definitions and keys to the orders, families and genera.—Natural History Museum of Los Angeles County, Science Series 28:1–190.
- Hartman, O. 1945. The marine annelids of North Carolina.—Bulletin of Duke University Marine Station 2:1–54.
- , and K. Banse. 1971. Deep water benthic polychaetous annelids off New England to Bermuda and other North Atlantic areas, Part 2.—Allan Hancock Monographs in Marine Biology 6:1–327.
- Hermans, C. O. 1979. Polychaete egg sizes, life histories and phylogeny. In: S. E. Stancyk (Ed.), Reproductive ecology of marine invertebrates.—The Belle W. Baruch Library in Marine Science 9:1–9.
- Hobson, K. D., and K. Banse. 1981. Sedentariate and archiannelid polychaetes of British Columbia and Washington.—Canadian Bulletin of Fisheries and Aquatic Sciences 209:1–144.
- Leidy, J. 1855. Contributions towards a knowledge of the marine invertebrates of the coasts of Rhode Island and New Jersey.—Journal of the Academy of Natural Sciences of Philadelphia 3:135–158.
- Light, W. J. 1974. Occurrence of the Atlantic maldanid *Asychis elongata* (Annelida, Polychaeta) in San Francisco Bay, with comments on its synonymy.—Proceedings of the Biological Society of Washington 87(17):175–184.
- Pilgrim, M. 1965. The functional anatomy and histology of the alimentary canal of the maldanid polychaetes *Clymenella torquata* and *Euclymene oerstedii*.—Journal of Zoology 147:387–405.
- . 1977. The functional morphology and possible taxonomic significance of the parapodia of the maldanid polychaetes *Clymenella torquata* and *Euclymene oerstedii*.—Journal of Morphology 152(3):281–302.
- Quatrefages, A. de. 1865. Histoire naturelle des Annéles marina et d'eau douce. Annélides et Gephyriens 1:1–588. Paris: Librairie Encyclopédique de Rôret.
- Verrill, A. E. 1873. Report upon the invertebrate animals of Vineyard Sound and the adjacent waters, with an account of the physical characters of the region.—U.S. Fish Commission Report for 1871–72:295–778.
- Zottoli, R. A. 1974. Reproduction and larval development of the ampharetid polychaete *Amphicteis floridus*.—Transactions of the American Microscopical Society 93(1):78–89.

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